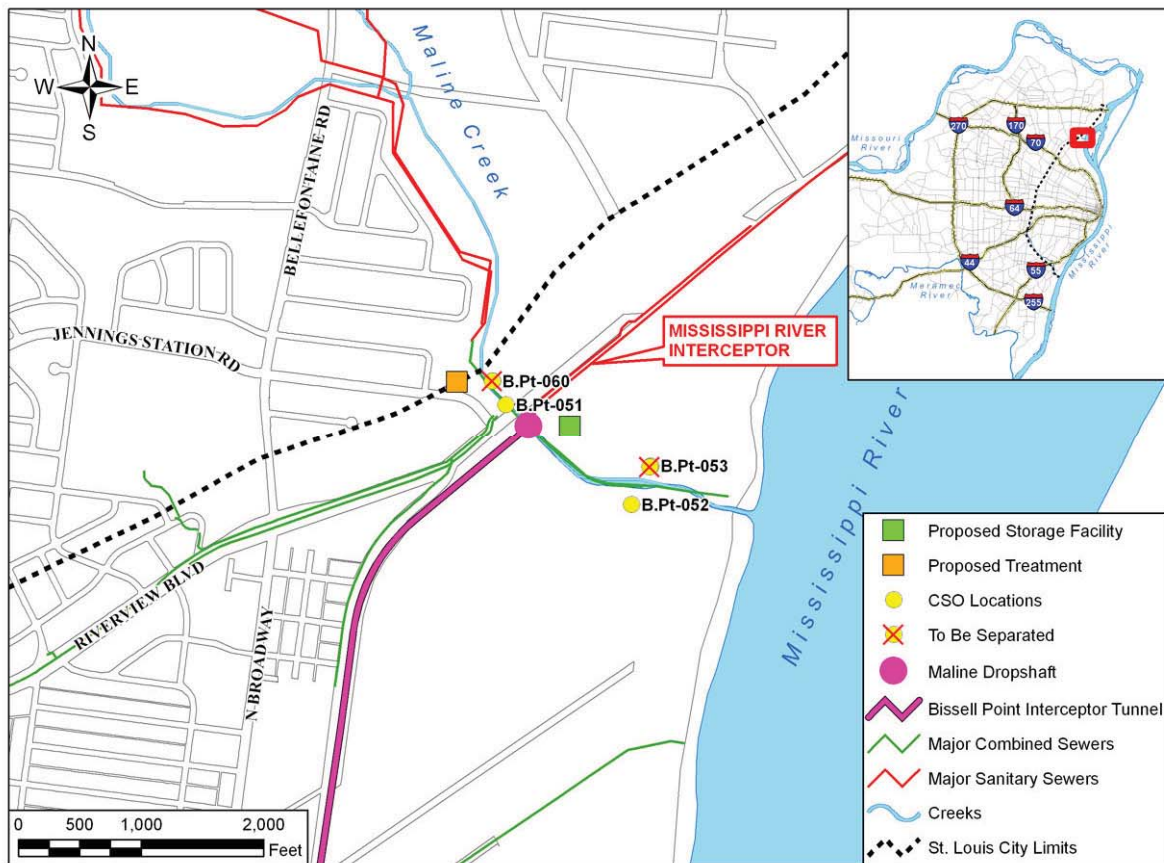


Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measures – Maline Creek

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Elimination of Bissell Point CSO Outfalls 053 and 060	Sewer separation to allow elimination of CSO Outfalls	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Bissell Point CSO Outfalls 053 and 060	<ul style="list-style-type: none"> Achievement of Full Operation – 01/01/2011
CSO Treatment Unit at Bissell Point Outfall 051	Enhanced High Rate Clarification facility	94 MGD capacity providing equivalent of primary clarification, solids/floatables disposal, and disinfection	Reduce overflows to 4 events or less, and 6 million gallons of untreated overflow volume in the typical year ⁽¹⁾ . Comply with applicable Missouri Operating Permit.	<ul style="list-style-type: none"> Bid Year – 2017 Achievement of Full Operation – 12/31/2020
Bissell Point Outfall 052 Storage Tank	Local storage facility	Provide storage volume of one million gallons, expandable to accommodate storage requirements, if any, as determined in SSO Control Master Plan	Reduce overflows to 4 events or less, and 20 million gallons of untreated overflow volume in the typical year ⁽¹⁾	<ul style="list-style-type: none"> Bid Year – 2017 Achievement of Full Operation – 12/31/2020



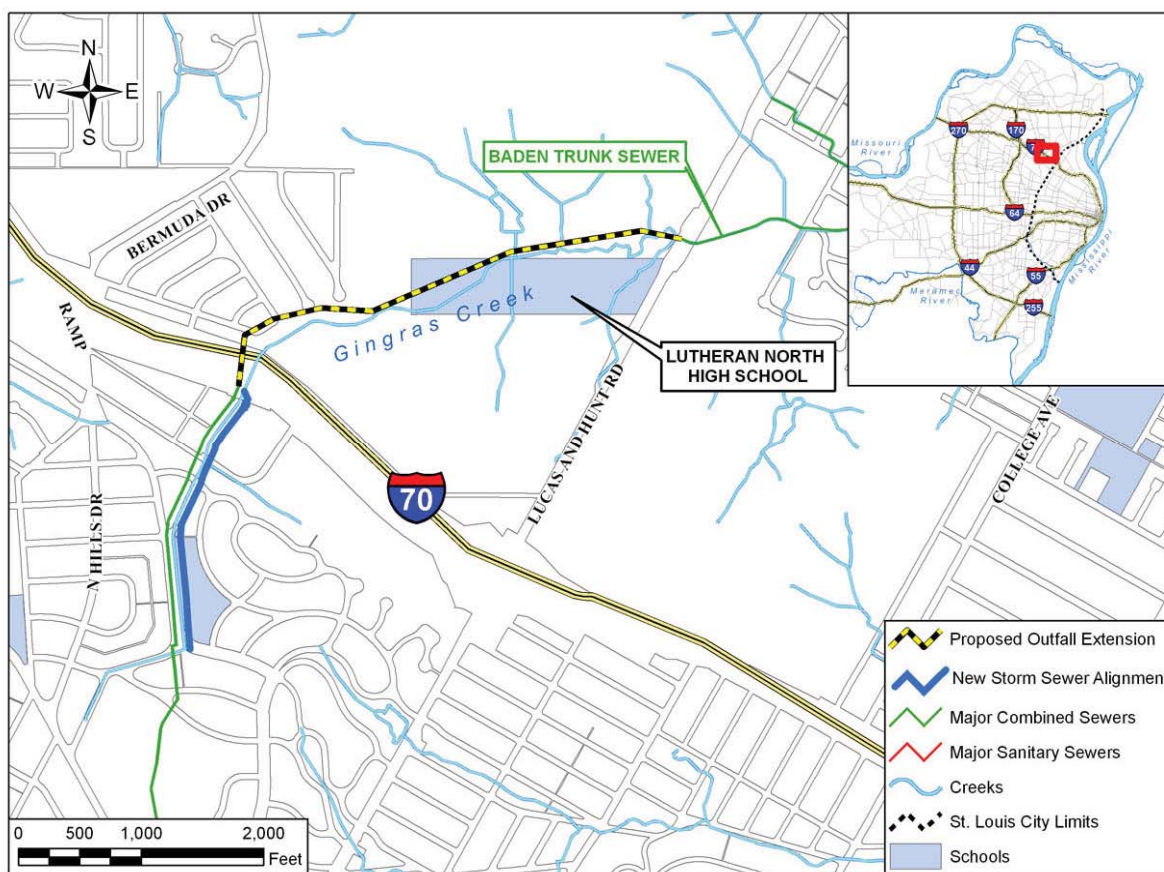
Maline Creek CSO Controls

Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measures – Gingras Creek

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Sewer Separation	Separation of sewers to reduce stormwater flow	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	When incorporated with other Gingras Creek CSO controls, eliminates Outfall 059 to Gingras Creek	<ul style="list-style-type: none"> Achievement of Full Operation – 06/30/2017
Bissell Point CSO Outfall 059 Relocation	Relocation of Outfall 059 from Gingras Creek to branch of Baden Trunk Sewer	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	When incorporated with other Gingras Creek CSO controls, eliminates CSO Outfall 059 to Gingras Creek	<ul style="list-style-type: none"> Achievement of Full Operation – 06/30/2017



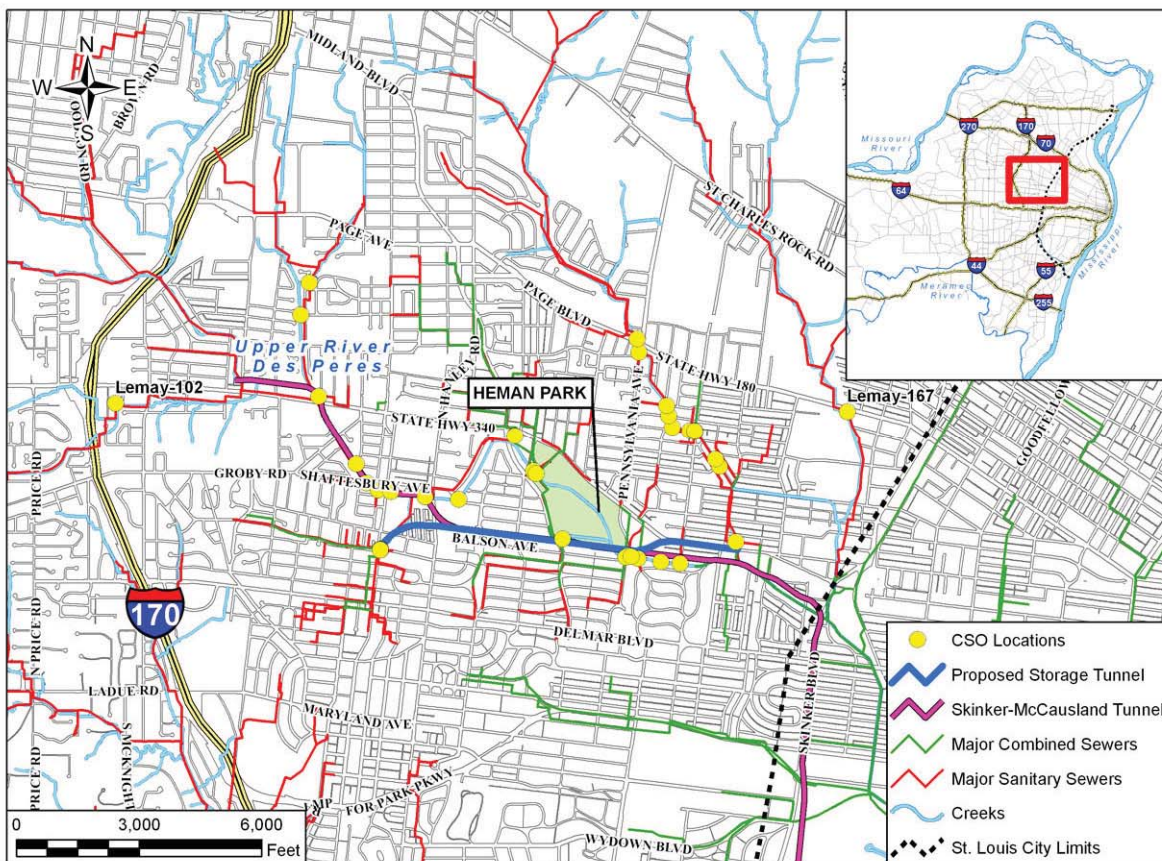
Gingras Creek CSO Controls

Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measures – Upper River Des Peres

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Upper River Des Peres Storage Tunnel serving Lemay Outfalls 064, 066 to 096, 099 to 102, 167, 178 and 180	Deep storage tunnel, near-surface facilities, pump station, sewer separation and consolidation sewers	Provide storage volume of 30 million gallons in deep tunnel system to capture flows from Lemay CSO Outfalls 064, 066 to 096, 099 to 102, 167, 178 and 180	When incorporated with other River Des Peres CSO controls, reduce overflows to 4 events or less, and 94 million gallons of untreated overflow volume in the typical year ⁽¹⁾	<ul style="list-style-type: none"> • Bid Year – 2028 • Achievement of Full Operation – 06/30/2034



Upper River Des Peres CSO Controls

Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

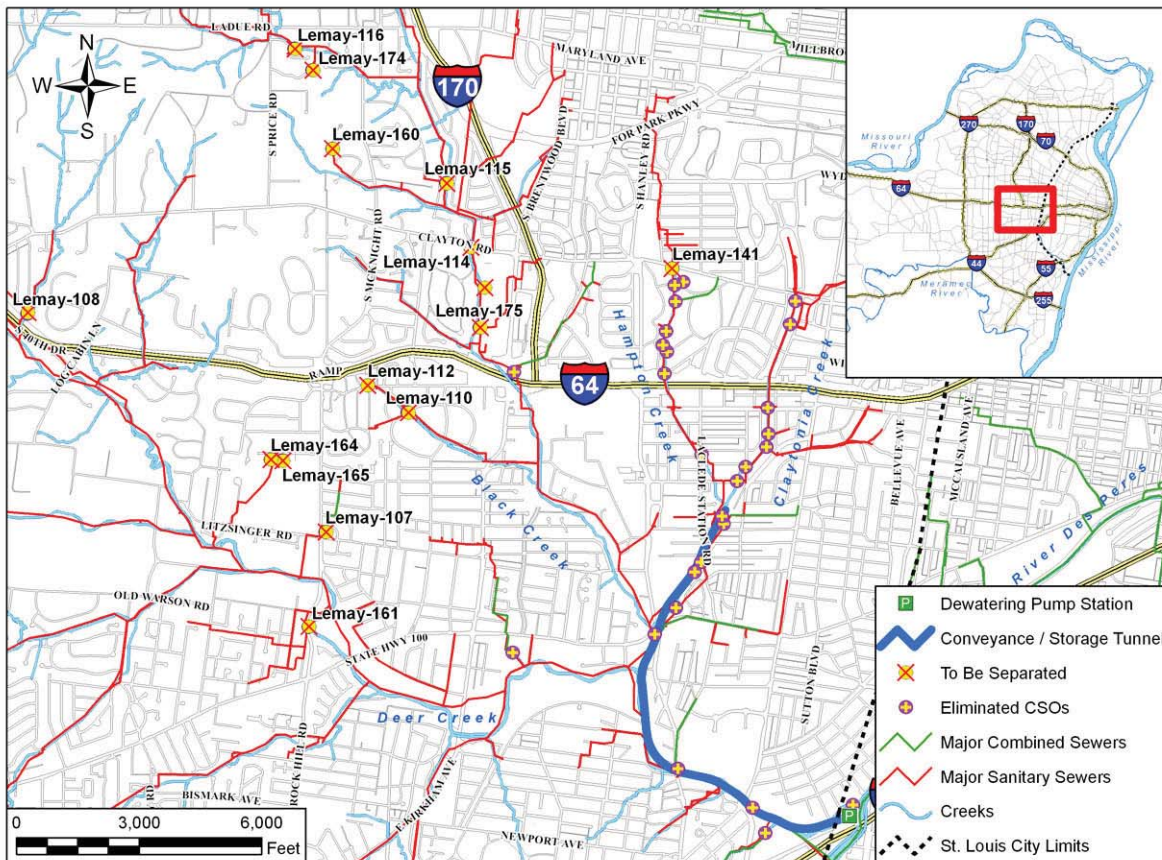
CSO Control Measures – River Des Peres Tributaries

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Elimination of Lemay CSO Outfalls 108, 110, 114, 115, 157, 164 and 165	Sewer separation to allow elimination of CSO Outfalls	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfalls 108, 110, 114, 115, 157, 164 and 165	<ul style="list-style-type: none"> • Achievement of Full Operation – 01/01/2011
Lemay CSO Outfall 107 Elimination	Sewer separation to allow elimination of Lemay Outfall 107	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 107	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012
Lemay CSO Outfall 112 Elimination	Sewer separation to allow elimination of Lemay Outfall 112	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 112	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012
Lemay CSO Outfall 116 Elimination	Sewer separation to allow elimination of Lemay Outfall 116	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 116	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012
Lemay CSO Outfall 141 Elimination	Sewer separation to allow elimination of Lemay Outfall 141	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 141	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012
Lemay CSO Outfall 160 Elimination	Sewer separation to allow elimination of Lemay Outfall 160	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 160	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012
Lemay CSO Outfall 161 Elimination	Sewer separation to allow elimination of Lemay Outfall 161	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 161	<ul style="list-style-type: none"> • Achievement of Full Operation – 06/30/2021
Lemay CSO Outfall 174 Elimination	Sewer separation to allow elimination of Lemay Outfall 174	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 174	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012
Lemay CSO Outfall 175 Elimination	Sewer separation to allow elimination of Lemay Outfall 175	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 175	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2012

Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
River Des Peres Tributaries Storage Tunnel serving Lemay CSO Outfalls 103, 104, 105, 106, 111, 117 to 128, 130, 131, 134, 136 to 140, 166 and 176	Storage / conveyance tunnel, near-surface facilities, pump station, sewer separation and consolidation sewers	Conveyance tunnel with storage volume of 28 million gallons to capture flows from Lemay CSO Outfalls 103, 104, 105, 106, 111, 117 to 128, 130, 131, 134, 136 to 140, 166 and 176	When incorporated with other River Des Peres CSO controls, reduce overflows to 4 events or less to River Des Peres main channel in the typical year ⁽¹⁾	<ul style="list-style-type: none"> • Bid Year – 2024 • Achievement of Full Operation – 06/30/2030



River Des Peres Tributaries CSO Controls

Appendix D

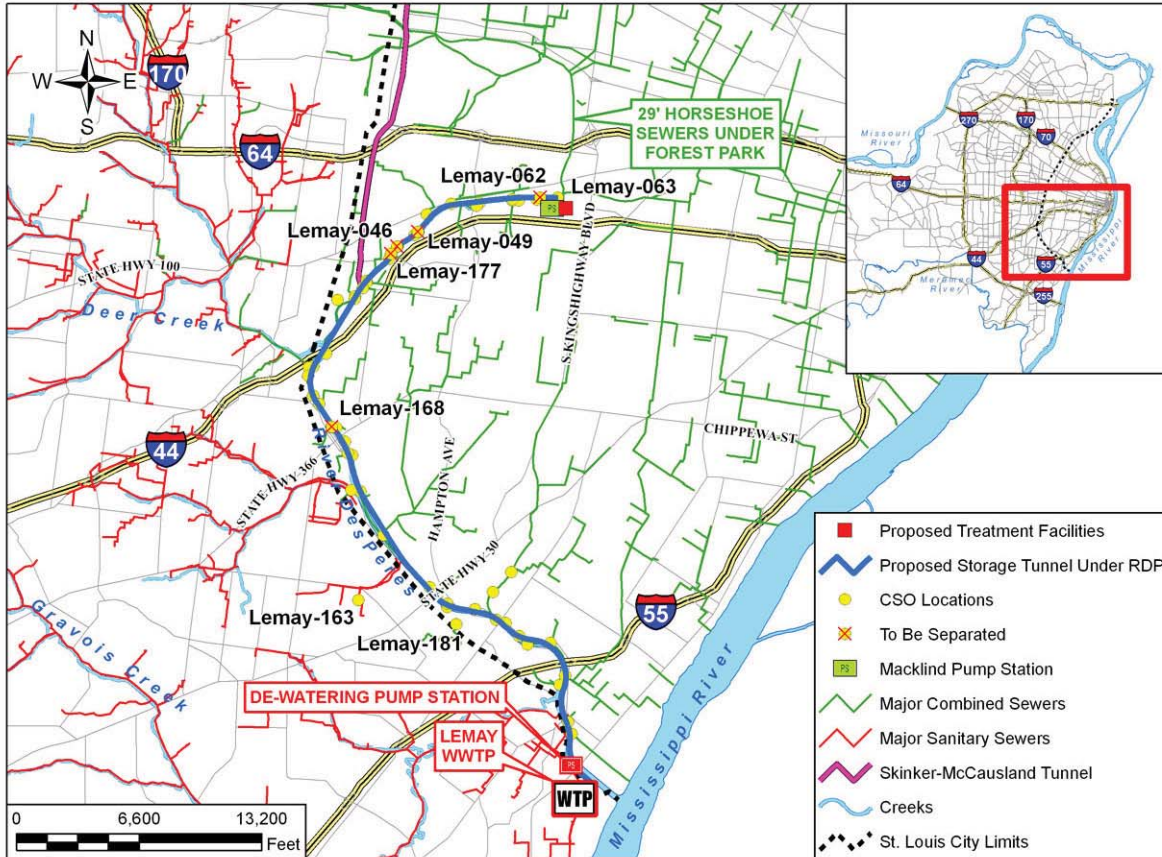
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measures – Lower & Middle River Des Peres

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Elimination of Lemay CSO Outfalls 046, 049, 168 and 177	Sewer separation to allow elimination of CSO Outfalls	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfalls 046, 049, 168 and 177	<ul style="list-style-type: none"> • Achievement of Full Operation – 01/01/2011
Lemay CSO Outfall 062 Elimination	Sewer separation to allow elimination of Lemay CSO Outfall 062	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Lemay CSO Outfall 062	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2015
CSO Treatment Unit at Lemay CSO Outfall 063	Enhanced High Rate Clarification facility	100 MGD capacity providing equivalent of primary clarification, solids/floatables disposal, and disinfection	When incorporated with other River Des Peres CSO controls, reduce overflows to 4 events or less in the typical year ⁽¹⁾ . Comply with applicable Missouri Operating Permit.	<ul style="list-style-type: none"> • Bid Year – 2027 • Achievement of Full Operation – 12/31/2030
In-sewer Storage Upstream of Lemay CSO Outfall 063	Inflatable or moveable dam system to allow flow storage in upstream 29-ft horseshoe sewers	Provide 25 million gallons storage capacity within existing sewer system to capture flows from Lemay CSO Outfall 063	When incorporated with other River Des Peres CSO controls, reduce overflows to 4 events or less in the typical year ⁽¹⁾	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2030
Lower & Middle River Des Peres Storage Tunnel serving Lemay CSO Outfalls 008 to 032, 036, 037, 039, 041 to 044, 048, 050, 052, 053, 054, 057, 058, 061, 063, 163, 170 to 173, and 181	Deep storage tunnel, near-surface facilities, pump station, sewer separation and consolidation sewers	Provide storage volume of 206 million gallons in deep tunnel system to capture flows from Lemay CSO Outfalls 008 to 032, 036, 037, 039, 041 to 044, 048, 050, 052, 053, 054, 057, 058, 061, 063, 163, 170 to 173, and 181	When incorporated with other River Des Peres CSO controls, reduce overflows to 4 events or less in the typical year ⁽¹⁾ , and untreated overflow volume to the River Des Peres of 1,412 million gallons from the Lower & Middle River Des Peres Storage Tunnel and the River Des Peres Tributaries Storage Tunnel combined.	<ul style="list-style-type: none"> • Bid Year – 2021 • Achievement of Full Operation – 12/31/2030

Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones



Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

Other CSO Control Measures

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Bissell Point CSO Outfall 055 Elimination	Sewer separation to allow elimination of Bissell Point CSO Outfall 055	MSD's Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities	Elimination of Bissell Point CSO Outfall 055	<ul style="list-style-type: none"> Achievement of Full Operation – 01/01/2011
Lemay Treatment Plant – Increase Secondary Treatment Capacity	Upgrade aeration tanks and ancillary systems to achieve peak wet-weather capacity of 210 MGD	10 CSR 20-8 for new facilities Existing facilities Design Basis	Provide peak wet-weather flow capacity of 210 MGD through secondary treatment. Operate treatment facilities to comply with Missouri State Operating Permit requirements. Upon completion of the stress test required by Appendix E, MSD shall operate the WWTP in accordance with the maximum treatable flow rate for each treatment step.	<ul style="list-style-type: none"> Achievement of Full Operation – 12/31/2015
Lemay Treatment Plant – Utilize Excess Primary Treatment Capacity – Phase I	Increase influent pumping, preliminary treatment and primary treatment capacity from 240 MGD to 290 MGD	10 CSR 20-8 for new facilities Existing facilities Design Basis	Provide peak wet weather flow capacity of 290 MGD through primary treatment when plant flows exceed secondary treatment capacity. Operate treatment facilities to comply with Missouri State Operating Permit requirements.	<ul style="list-style-type: none"> Achievement of Full Operation – 01/01/2011
Lemay Treatment Plant – Utilize Excess Primary Treatment Capacity – Phase II	Increase influent pumping, preliminary treatment and primary treatment capacity from 290 MGD to 340 MGD	10 CSR 20-8 for new facilities Existing facilities Design Basis	Provide peak wet weather flow capacity of 340 MGD through primary treatment when plant flows exceed secondary treatment capacity. Operate treatment facilities to comply with Missouri State Operating Permit requirements.	<ul style="list-style-type: none"> Achievement of Full Operation – 12/31/2015
Bissell Point Treatment Plant – Utilize Excess Primary Treatment Capacity	Utilize excess 100 MGD preliminary and primary treatment capacity to treat wet weather flows	10 CSR 20-8 for new facilities Existing facilities Design Basis	Provide peak wet weather flow capacity of 350 MGD through primary treatment when plant flows exceed secondary treatment capacity and when total plant flow is not limited by river flooding. Operate treatment facilities to comply with Missouri State Operating Permit requirements.	<ul style="list-style-type: none"> Achievement of Full Operation – 01/01/2011

Appendix D

CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measure	Description	Design Criteria	Performance Criteria	Critical Milestones
Green Infrastructure Program – Pilot Program	Stormwater retrofitting of abandoned properties in Bissell Point and Lemay service areas	Capture runoff from existing or future impervious areas on properties and, if possible, adjacent impervious streets and alleys, in accordance with Section 12 of the Long-Term Control Plan.	Apply green infrastructure on 200 to 400 abandoned properties, encompassing 20 to 40 acres, with a total expenditure of at least \$3 million. MSD shall submit to EPA and the State for review and for EPA’s approval, with a copy to the Coalition, the Pilot Program Final Report.	<ul style="list-style-type: none"> • Achievement of Full Operation – 12/31/2015
Green Infrastructure Program	Stormwater retrofitting of abandoned properties in Bissell Point and Lemay service areas	Capture runoff from existing or future impervious areas on properties and, if possible, adjacent impervious streets and alleys, in accordance with Section 12 of the Long-Term Control Plan and the plan for full-scale implementation contained in the Pilot Program Final Report.	Performance Criteria to be identified in Pilot Program Final Report, with a minimum expenditure of \$100 million total which includes the pilot program.	<ul style="list-style-type: none"> • Achievement of Full Operation – 06/30/2034

¹ CSO Control Measures will be designed to reduce the number of overflows to Maline Creek and the River Des Peres to achieve a Performance Criteria of 4 overflow events or less in the “typical year.” The term “overflow event” means an overflow at one or more CSO Outfalls on a receiving stream segment, based on a 6-hour inter-event time, that does not receive the equivalent of primary clarification, solids and floatables disposal, and disinfection, if necessary to meet water quality standards. “Typical year” performance and achievement of Performance Criteria shall be assessed in accordance with the Post-Construction Monitoring Program using the annual statistics generated by the hydraulic model based on the Year 2000 hourly precipitation data from Lambert St. Louis International Airport.